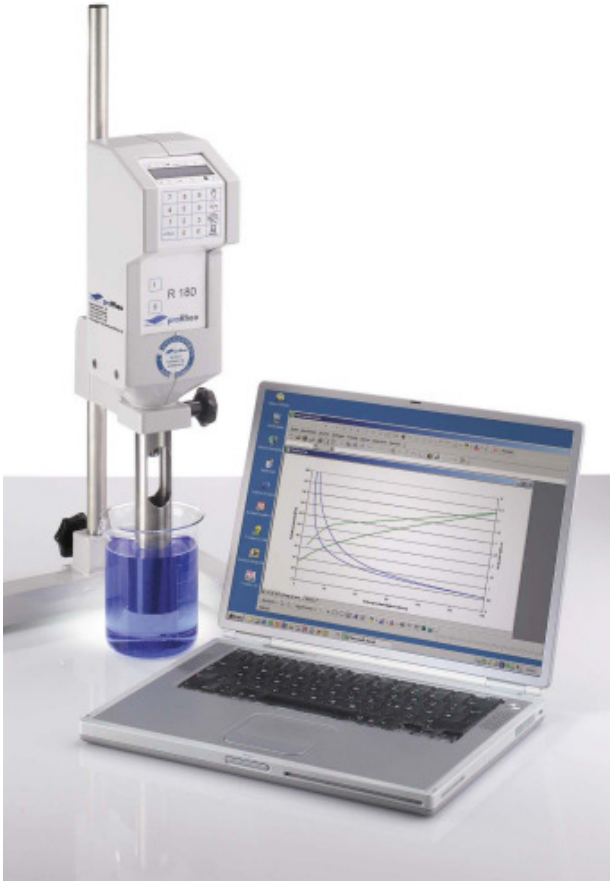

Instruction Manual

Rhesy S for Rheomat R 180

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Index

1. Introduction ... 3
1.1. Hardware requirements ... 3
1.2. Transmission rate ... 4
1.3. Software Installation ... 4
1.4. Options ... 5
1.4.1. Program ... 5
1.4.2. Measurement parameters ... 6
1.4.3. Julabo ... 7
2. Importing Data ... 8
3. Analysis ... 11
3.1. Tabular ... 12
3.2. Diagram ... 13
3.3. Viscosity / time dependancy ... 14
3.4. Viscosity / temperature dependancy ... 15
4. Measuring specifications ... 16
4.1. Flow Curve ... 16
4.2. Temperature sweep (Rhesy T) ... 18
5. Starting a measurement ... 20
5.1. Flow curve ... 20
5.2. Temperature sweep ... 22
6. Application example ... 24
6.1. Silicone oil ... 24
6.2. Liquid soap ... 25
7. Tips and tricks ... 26
8. Safety guidelines ... 27
9. Support / Service ... 29

1. Introduction

Rhesy S is software for processing rheologic data provided from one of the viscometers Rheomat R 180, R 180T, RM 180 and RM 225. The software enables you to save, interpret or convert to ASCII or EXCEL format. There are also various evaluation possibilities available.

Furthermore the software enables you to define and save measuring templates meaning routine measurements can be easily repeated. Included on the installation CD you will find some examples of measurement data that has been recorded using the Rheomat R 180.

Rhesy T additionally offers the possibility to automatically measure temperature sweeps, so that the dependency of viscosity / temperature can be examined.

1.1. Hardware requirements

Machines supported:

Intel or Intel-compatible Pentium class processor from 166 MHz
64 MB RAM
CD-ROM Drive
Rhesy S: 1 free serial or USB port
Rhesy T: 2 free serial or USB ports
Windows 98 / ME / NT 4.0 / 2000 / XP / 7
Mouse

Please make sure that your operating system has been updated appropriately.

Using the serial port: Identify and note the COM port that the laboratory viscometer Rheomat R 180 is connected to. This information will be needed after the software has been installed.

Using the USB port: Plug the USB to serial cable into a free USB port. A suitable cable can be ordered separately (Item No: 401 0920). Install the necessary drivers according to the supplied instructions. Identify and note the COM port that the cable has been assigned by checking the System Properties / Hardware / Device manager

Note: Rhesy S is supplied with a serial connection lead as standard. The communication between the PC and the Rheomat R 180 viscometer is possible using this lead only. When using the Rheomat R 180 via USB, the supplied serial cable has to be connected to the “Serial to USB” cable.

1.2. Transmission rate

On your Rheomat R 180, set the required transmission rate for data communication to one of the following speeds (2400, 4800, 9600) The RHEOMAT R 180 comes with a factory setting of 9600 Baud.
When switching the Rheomat R 180 on, press the “automatic” button. By entering code 33 you can then enter the desired connection speed e.g. 9600

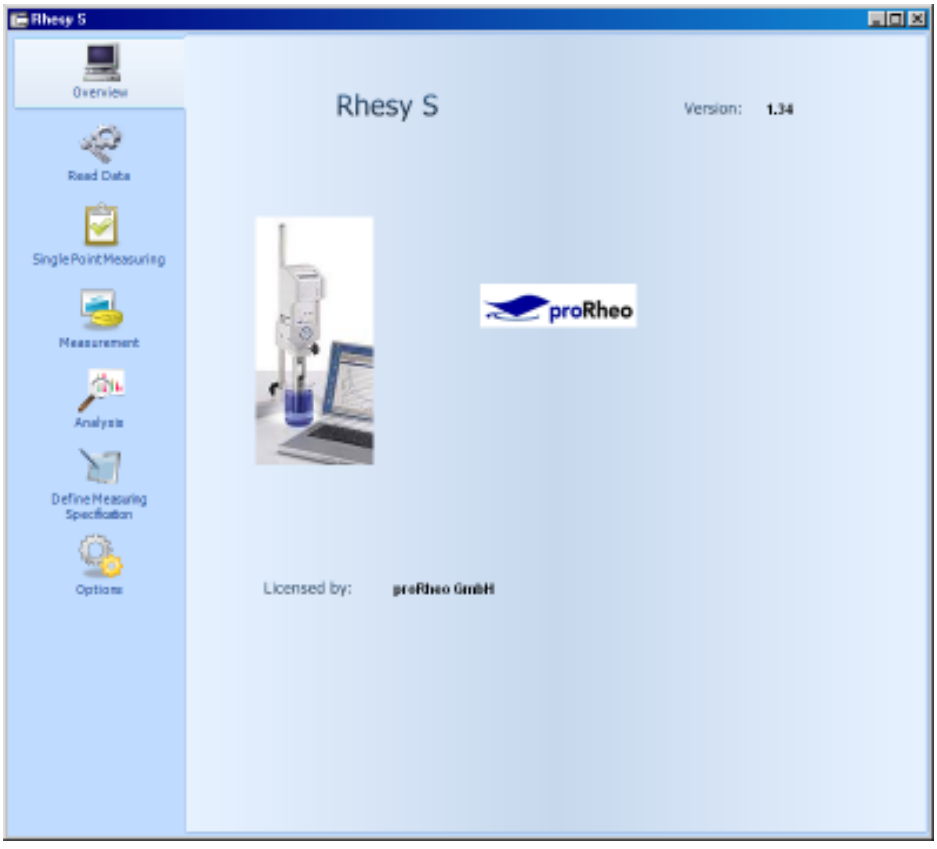
The software also functions with previous models of the RM 180 made by Mettler-Toledo or Rheometric Scientific. The connection speed of the previous models is permanently set to 2400 Baud.

1.3. Software Installation

Insert the CD into your CD-ROM drive. Installing the software can be achieved by double clicking the Program icon.

After installation, you will find the software under:
Start / program files / proRheo / Rhesy S

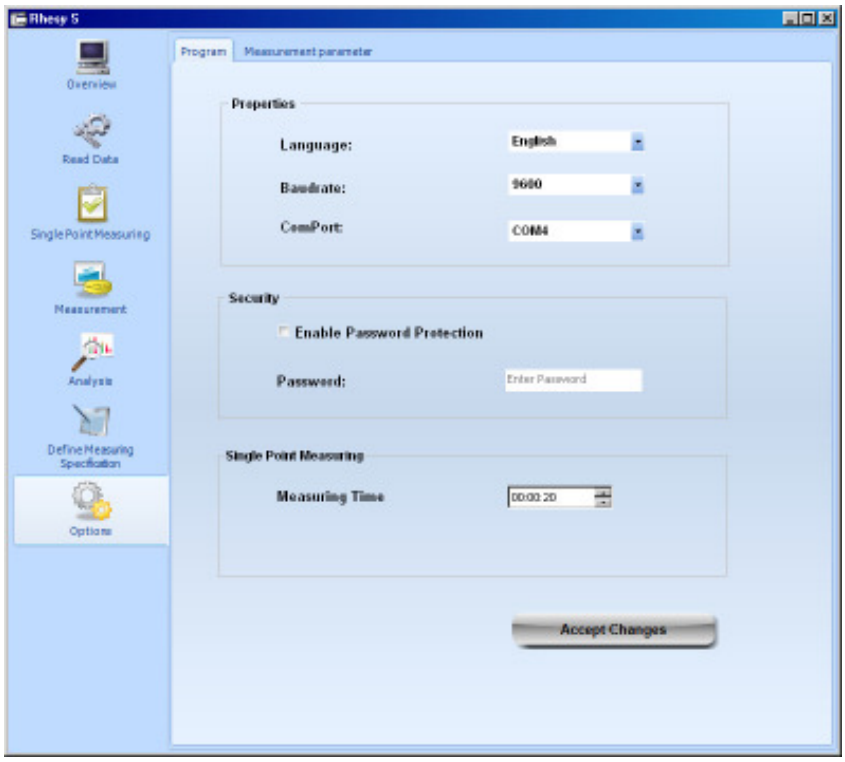
After starting the software the following window should appear:



1.4. Options

1.4.1. Program

Initially, under Options / Program, the following parameters have to be set:



Default settings

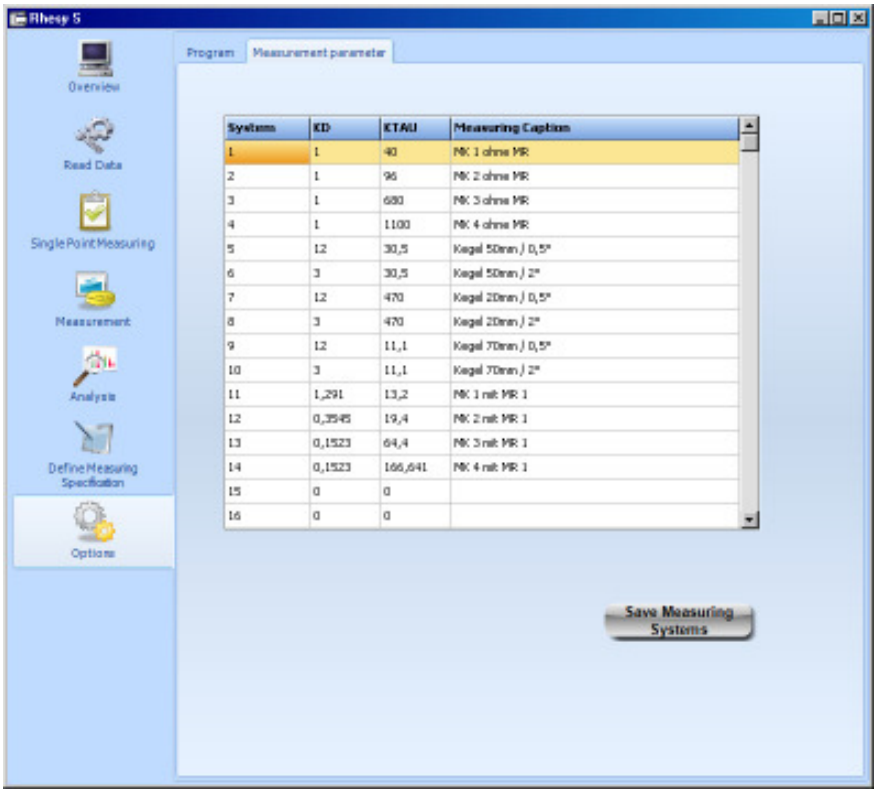
Language: choose your desired language (English or German)

Password protection: Enables assistants to operate the software without the possibility of changing any of the default values in “Options” and “Measurement parameters”.

Measuring Time: time needed for single point measurements. The minimum default value is 20 seconds.

1.4.2. Measurement parameters

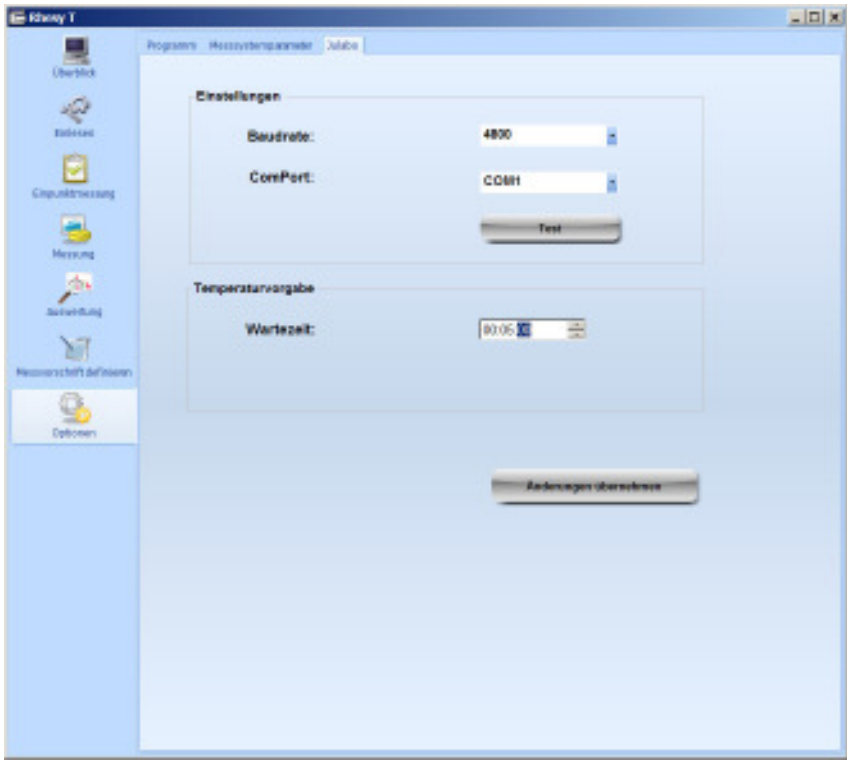
To measure shear stress, shear rate and viscosity the software needs various parameters from the measuring system used. All standard measuring systems available for the Rheomat R 180 are pre- defined. When using self defined measuring systems, the parameters in the software and the Rheomat R 180 have to be adapted accordingly.



Pressing and holding the “Print“-button whilst switching the Rheomat R 180 on prints the defined measuring systems programmed into your Rheomat R 180.
(A printer has to be connected via the printer port of the Rheomat R 180 for this function to work!!)

1.4.3. Julabo

(Rhesy T only)



The default transfer rate for communication with the cryostat is set to 4800 Baud. If changes to the cryostat itself have been made, then please ensure that these changes are also changed in the software.

Check which COM port has been used to connect the cryostat and enter the correct port here.

You can test the communication between Rhesy T and the cryostat by pressing the “Test” button.

Latency: enter the time needed before starting a flow curve measurement. (Time between cryostat reaching temperature and specimen fully reaching temperature)

When all values have been set, please click “Save changes“ to ensure that these values are saved and can be used the next time the software is started.

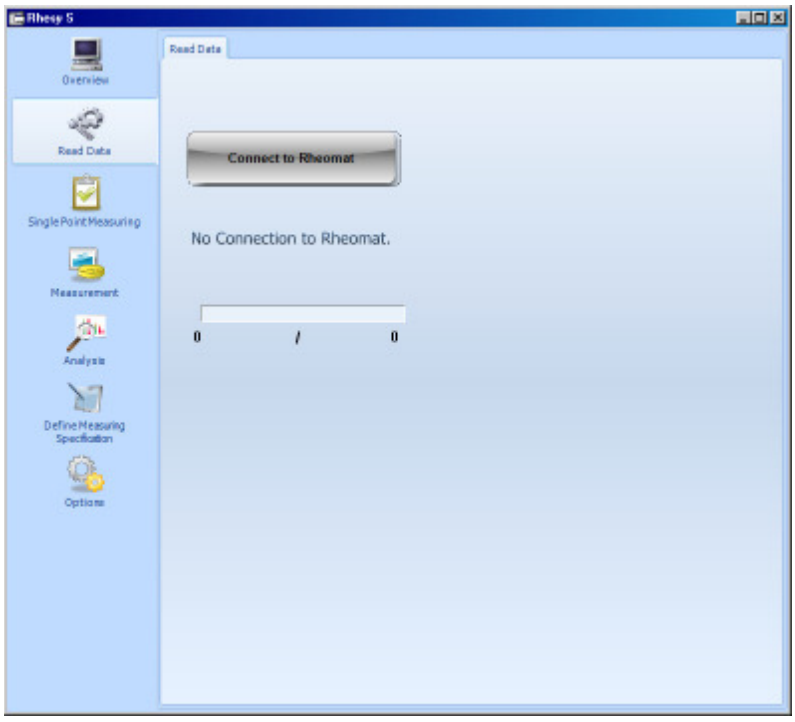
2. Importing Data

Importing data from the Rheomat R 180 or RM180 requires that at least one automatic measurement has been absolved and saved with the connected viscometer. The measuring data is sent via the viscometers serial interface as soon as the “Print” button is pressed.

Tutorial:

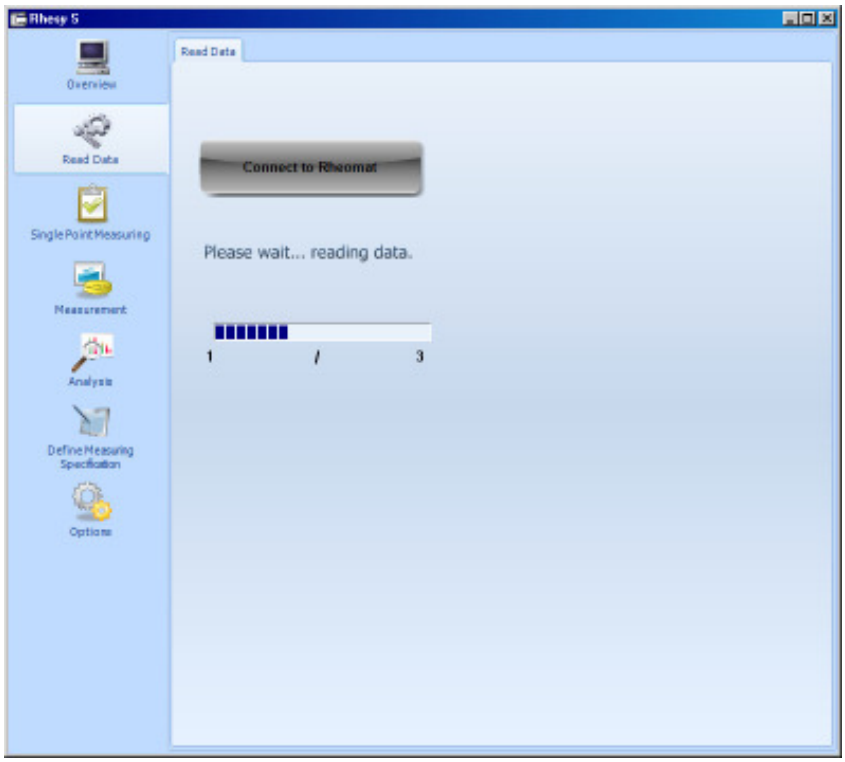
- Connect the Rheomat R 180 to your PC as described under point 1
- Please ensure that the Rheomat R 180 has already absolved at least 1 measuring in automatic mode and that data has been saved within the Rheomat.
- Switch off the Rheomat.
- Go to “Read Data” in the software.
- Click on “Connect to Rheomat”
- Switch on the Rheomat and when the temperature is shown in the display press the “computer” button on the Rheomat R 180.
- Data will be imported.

During import, a progress bar is shown to display the current “% complete” of the import process.

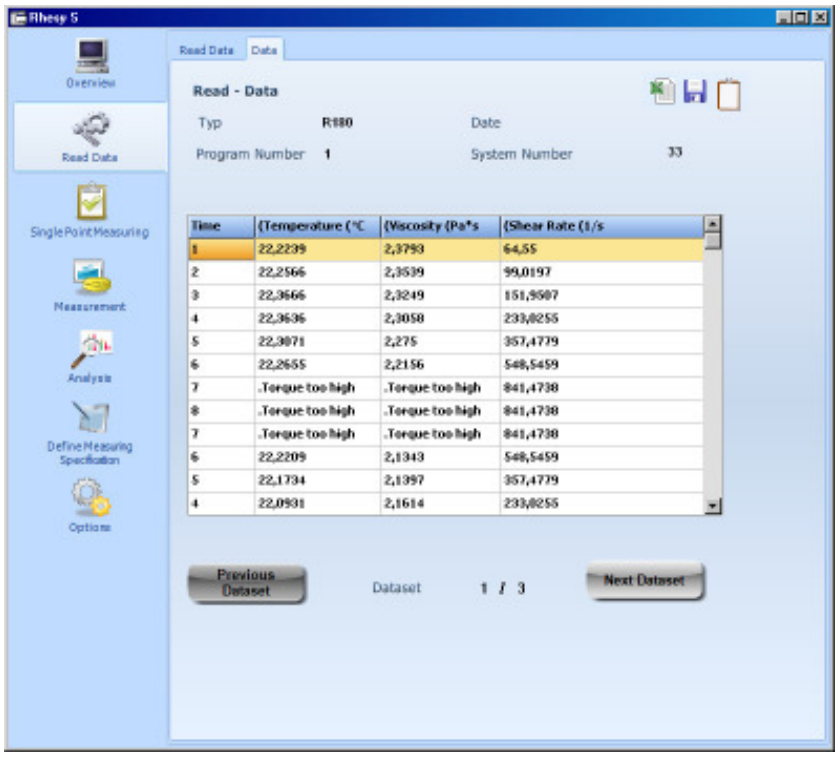


Note: The Rheomat R 180 always transfers all saved measuring data!

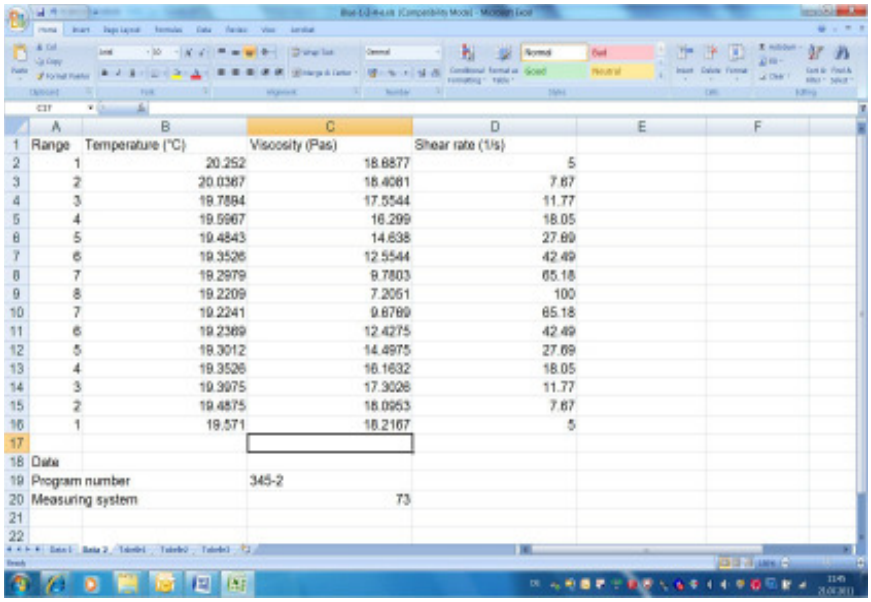
The measuring data is not removed from the Rheomat R 180 after being transferred to a PC. This means further measurings can be added to the viscometer. To delete the stored data, press and hold the “Arrow” button when switching the Rheomat R 180 on.



After the measuring data has been imported, Rhesy S (T) enables you to save the data in different formats:



- Excel-File: Every data set is stored on a separate sheet.

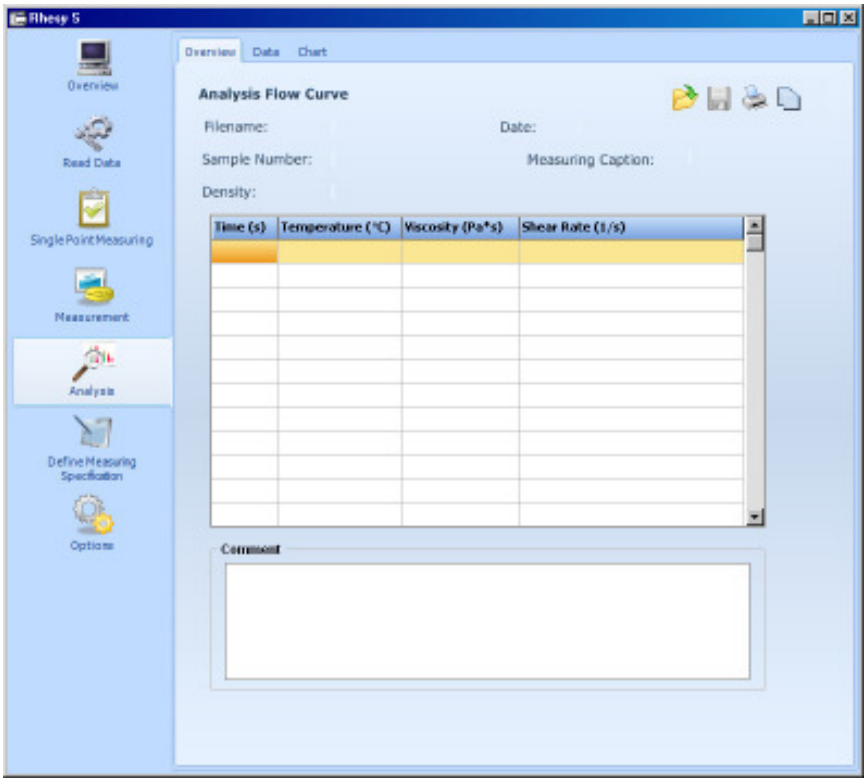


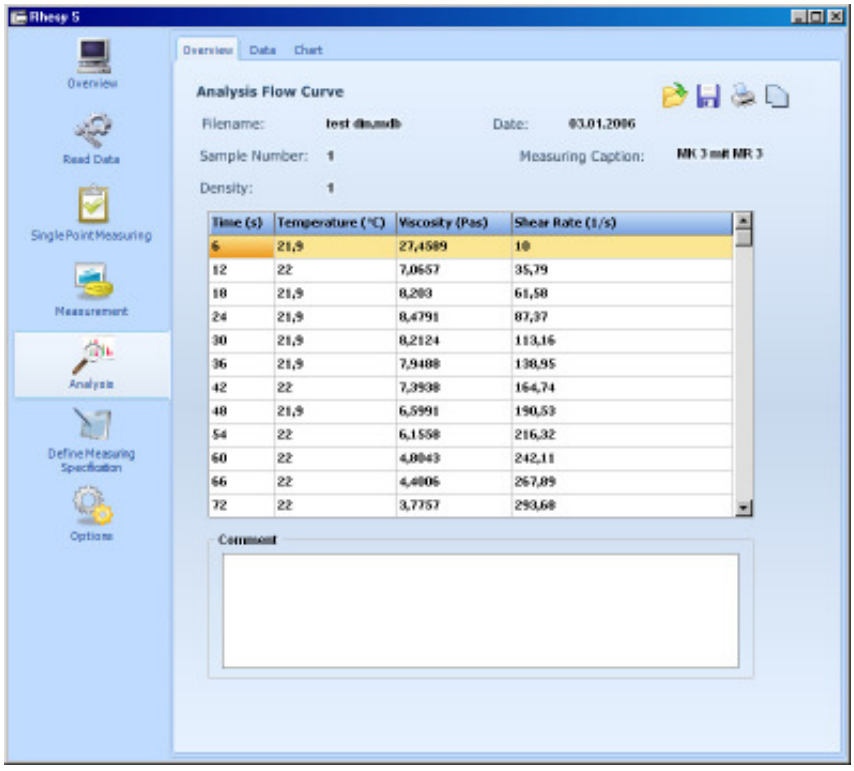
	A	B	C	D	E	F
1	Range	Temperature (°C)	Viscosity (Pas)	Shear rate (1/s)		
2	1	20.252	18.8877	5		
3	2	20.0367	18.4081	7.67		
4	3	19.7884	17.5544	11.77		
5	4	19.5967	16.299	18.05		
6	5	19.4843	14.638	27.69		
7	6	19.3526	12.5544	42.49		
8	7	19.2979	9.7803	65.18		
9	8	19.2209	7.2061	100		
10	7	19.2241	9.6789	65.18		
11	6	19.2389	12.4275	42.49		
12	5	19.3012	14.4975	27.69		
13	4	19.3526	16.1632	18.05		
14	3	19.3975	17.3026	11.77		
15	2	19.4875	18.0953	7.67		
16	1	19.571	18.2167	5		
17						
18	Data					
19	Program number		345-2			
20	Measuring system		73			
21						
22						

- As a file, useable for the Rhesy internal evaluation functions, or as a ASCII file for transferring the data to other programmes. The later two formats create a separate file for every dataset imported.

3. Analysis

To open a dataset, click on the Folder icon located at the top right of the window and choose your desired file.



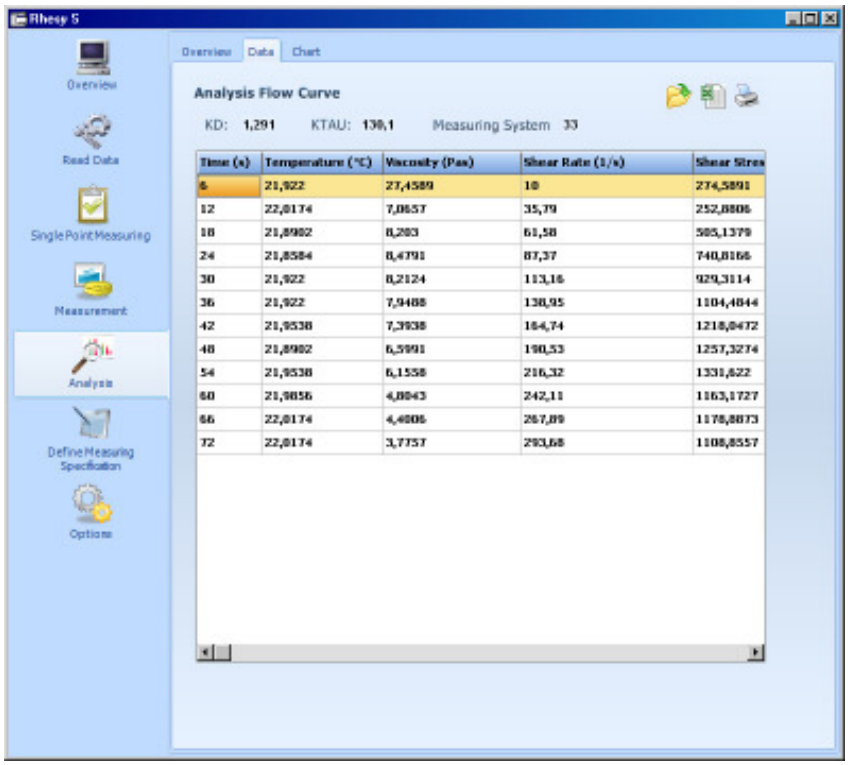


In the lower comment field, comments can be added. These will be saved within the file for future reference.

The other icons allow you to print and import data from earlier Rhesy versions. Later enabling you to save in the newer format.

3.1. Tabular

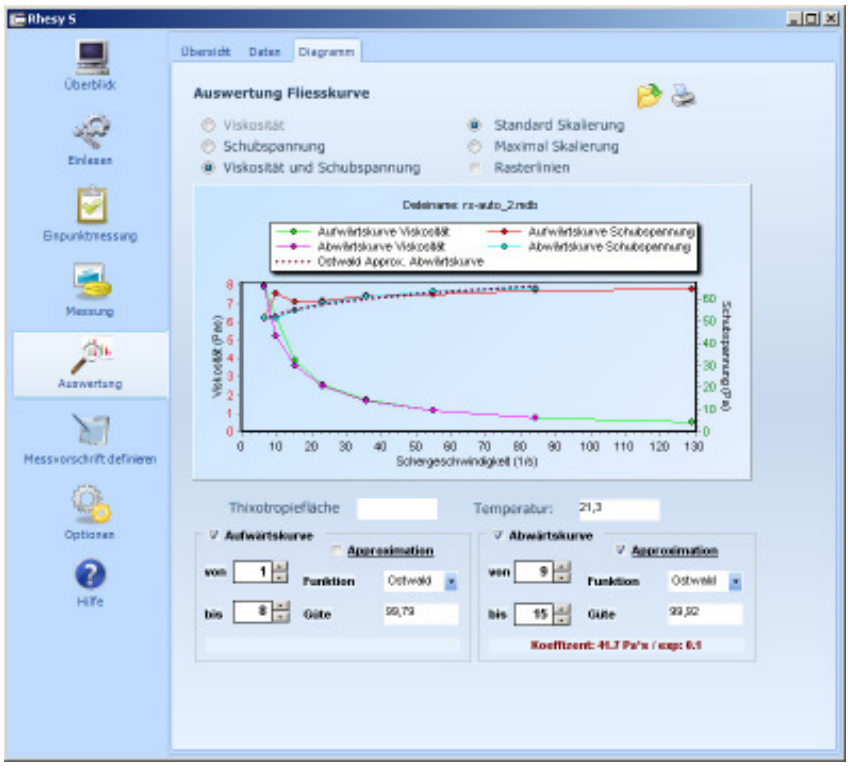
Under the “Data“ tab, all data that has been collected is shown. This data can also be printed or saved in Excel format.



Rheologic note: Please note that all measuring data should have a torque reading of min 0.5 mNm and max 9.5 mNm. If this not the case, then the measuring system or the shear rate my have to be adjusted. Further information can be found in the instruction manual of the Rheomat R 180**.**

3.2. Diagram

After clicking the “Diagram“ tab you will receive a graphic display of the measured values.



This tab offers the following possibilities:

Choosing between viscosity or shear stress via the shear rate.

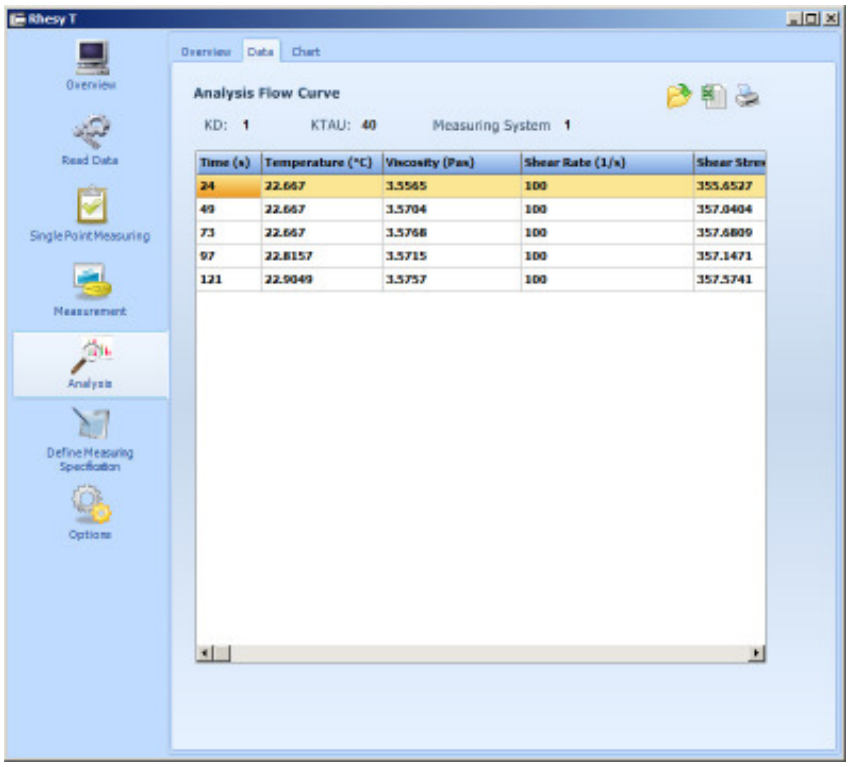
Approximation function und Thixotropic plane: 4 various interpretation functions are available: Ostwald, Casson und Bingham. The thixotropic plane describes the difference between upwards and downwards ramp directions of the flow curve. (For further information see: Rheologie, Praxisorientierte Grundlagen und Glossar, Vincentz Verlag, ISBN: 3-87870-449-6

Upwards / downwards points - from / to:
In this example, the measuring was made up from 15 measuring points where the first 8 points show a larger shear rate than normal. From point 8 onwards the shear rate falls again, going back to the initial value. Calculation of the approximation function is based on either the upward or the downward curve. The curves used for calculation can be limited by using the “from” / “to” function.

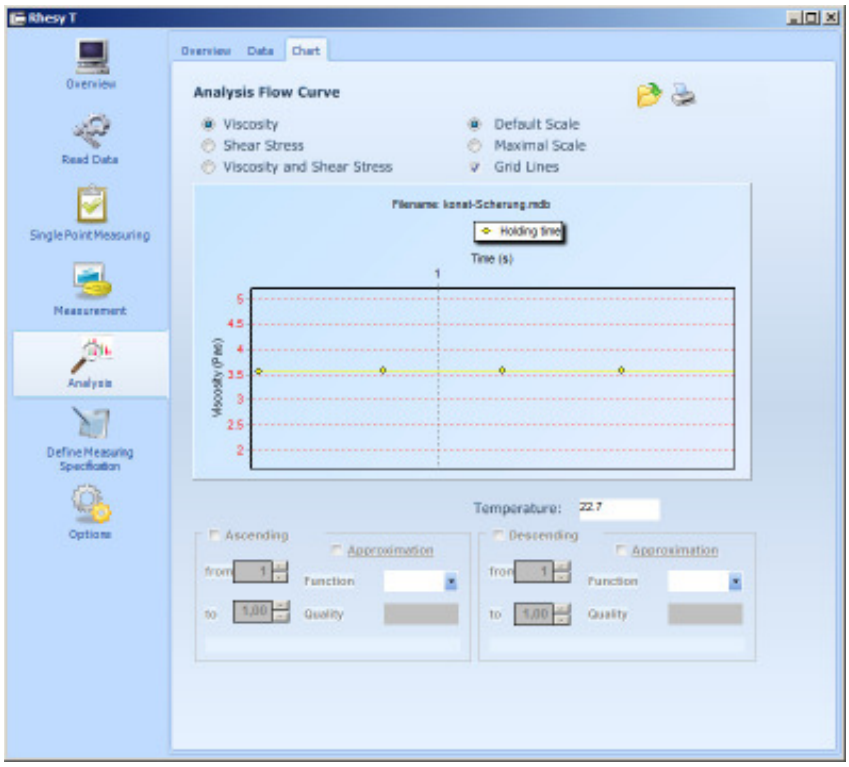
The best approximation function for the measuring data is automatically suggested, but changing to a different rheologic function is possible if needed.

3.3. Viscosity / time dependency

Viscosity and time values in tabular form:

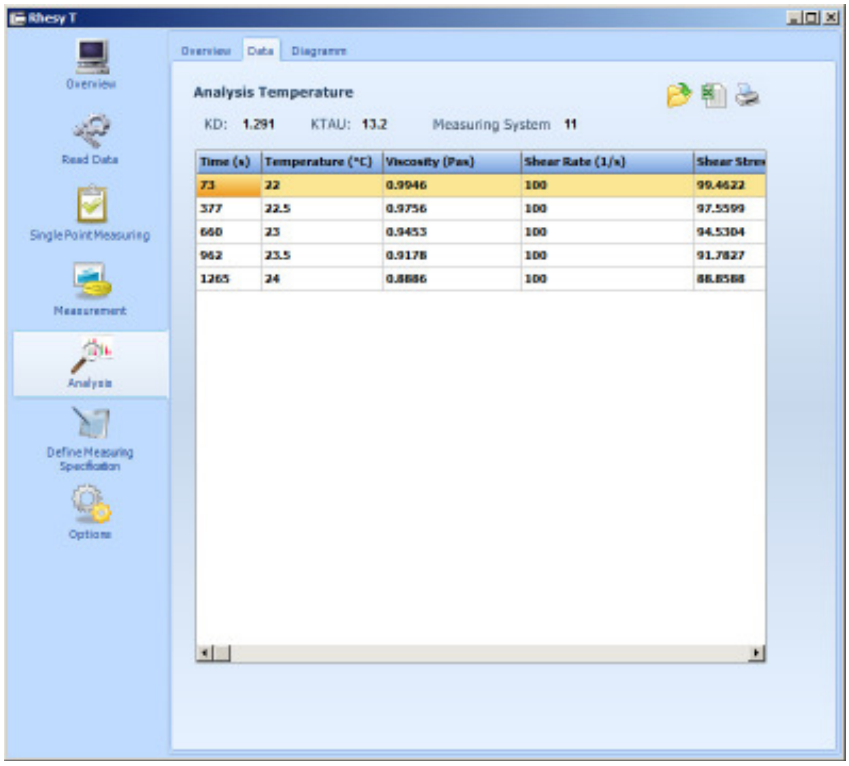

Rhesy T
Overview
Data
Chart
Analysis Flow Curve
KD: 1
KTAU: 40
Measuring System 1
Time (s) | Temperature (°C) | Viscosity (Pas) | Shear Rate (1/s) | Shear Stres
24 | 22.667 | 3.5565 | 100 | 355.6527
49 | 22.667 | 3.5704 | 100 | 357.0404
73 | 22.667 | 3.5768 | 100 | 357.6809
97 | 22.8157 | 3.5715 | 100 | 357.1471
121 | 22.9049 | 3.5757 | 100 | 357.5741
Read Data
Single Point Measuring
Measurement
Analysis
Define Measuring Specification
Options

… and as a diagram….

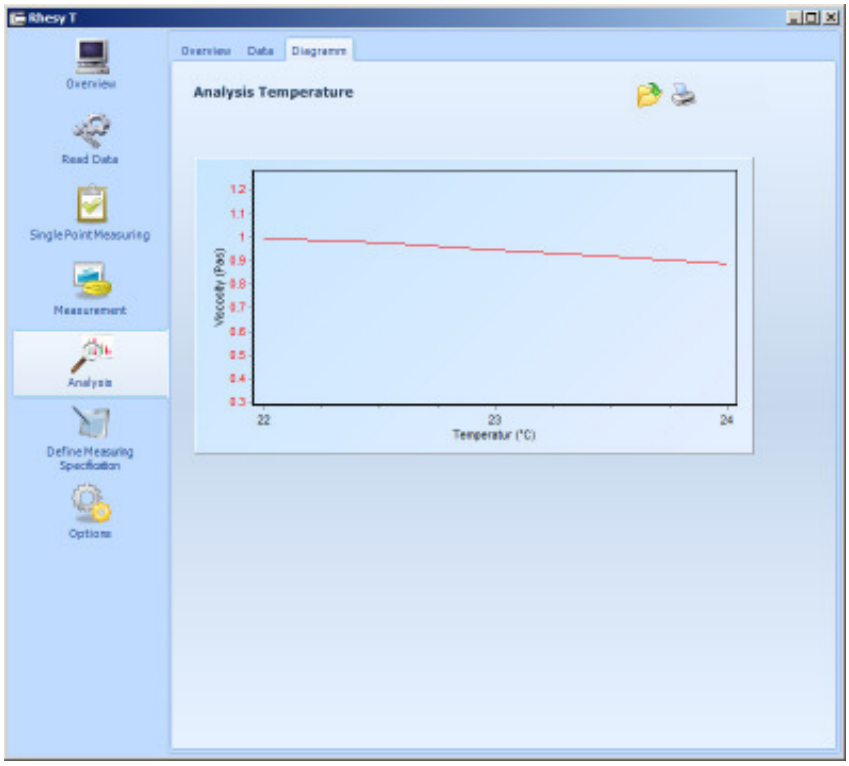


3.4. Viscosity / temperature dependency

Viscosity and temperature values in tabular form:

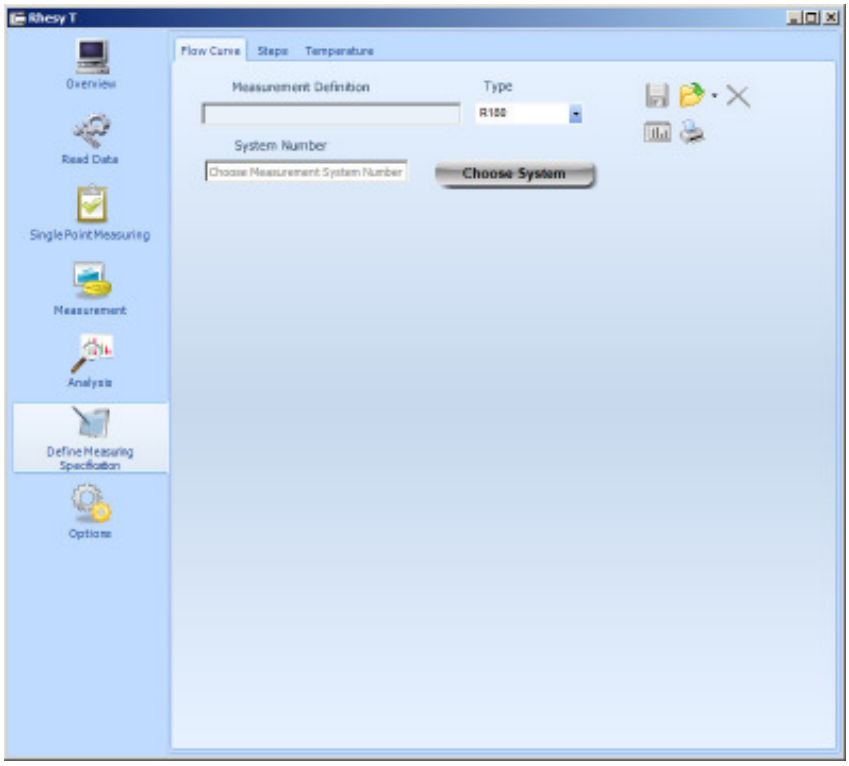

Rhesy T
Overview
Data
Diagramm
Read Data
Single Point Measuring
Measurement
Analysis
Define Measuring Specification
Options
Analysis Temperature
KD: 1.291
KTAU: 13.2
Measuring System 11
Time (s) | Temperature (°C) | Viscosity (Pas) | Shear Rate (1/s) | Shear Stre
73 | 22 | 0.9946 | 100 | 99.4622
377 | 22.5 | 0.9756 | 100 | 97.5599
660 | 23 | 0.9453 | 100 | 94.5304
962 | 23.5 | 0.9178 | 100 | 91.7827
1265 | 24 | 0.8886 | 100 | 88.8588

… and as a diagram….



4. Measuring specifications

The following window should open:



Usually the measuring specifications are set for creating flow curves. In some cases step measuring may be required, and can be defined in the “Steps” tab.

When using a constant shear rate for measuring, use the “Flow Curve” function.

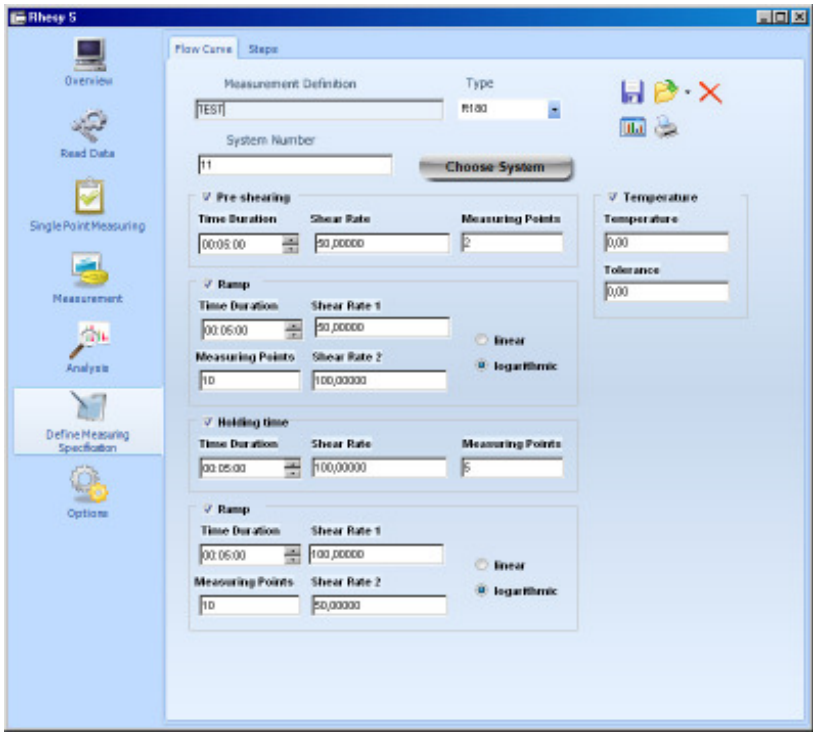
Open an existing measurement definition by clicking on the Folder icon, or create a new one by clicking the disk.

4.1. Flow Curve

Type in the required name for the measuring definition. Please assure that no special characters (spaces are allowed) are within the chosen name

Measuring system: Choose the type of measuring system by clicking on the “Choose measuring system” button and select the system in use.

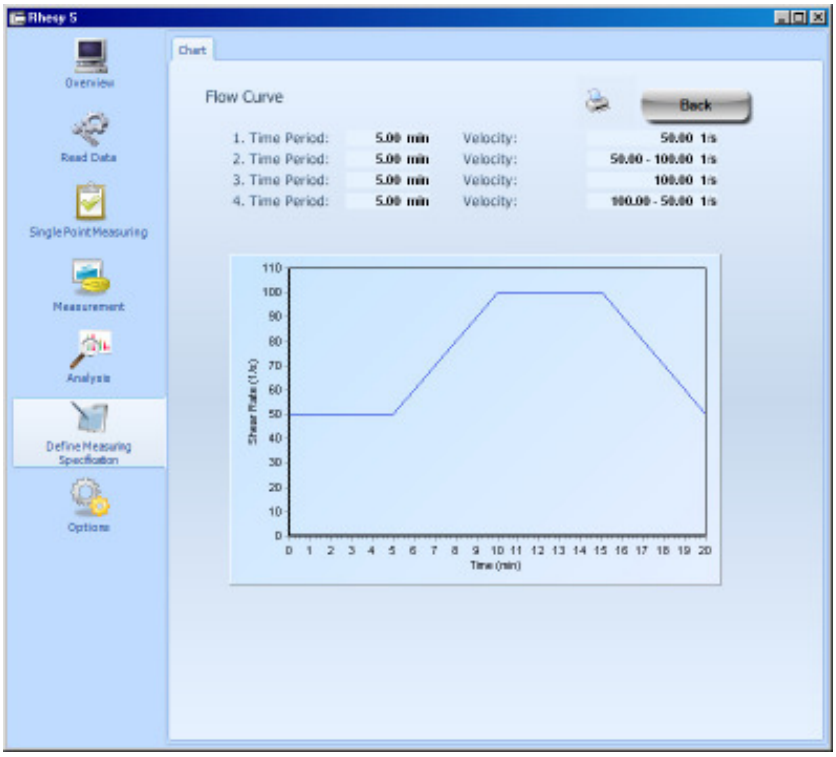
Type of Rheomat: Choose which Rheomat is being used with the software from the pull down menu. (Rheomat R 180, R 180T, RM180 or R 225)



Pre shearing is measuring with a constant speed right from the beginning of the measuring process.

Pre shearing: Tick the box if pre shearing is required. Un-tick if not required.
Time duration: Enter required time of pre shearing.
Shear rate: Enter required shear rate.
Measuring points: Enter required number of measuring points used in pre shearing.
Ramp: A ramp causes the shear rate to be time-dependently increased or de creased.
Shear rate 1: Enter required starting shear rate.
Shear rate 2: Enter required ending shear rate.
Number of measuring points: Enter the amount of points to be included in the ramp.
Linear / Logarithmic: Decides on whether the measuring points are spaced out in a linear or logarithmic way. Linear means evenly spaced, logarithmic means the lower the shear rate, the tighter together the measuring points will be spaced out.
Holding time: Holding time is the time at which the shear rate is constant between both of the ramps.
Temperature: The measuring starts when the entered temperature (minus tolerance) is reached.
Icons (Top right of window): Save, Open an existing measuring specification, Delete, Graphic representation and Print.

Graphic representation:

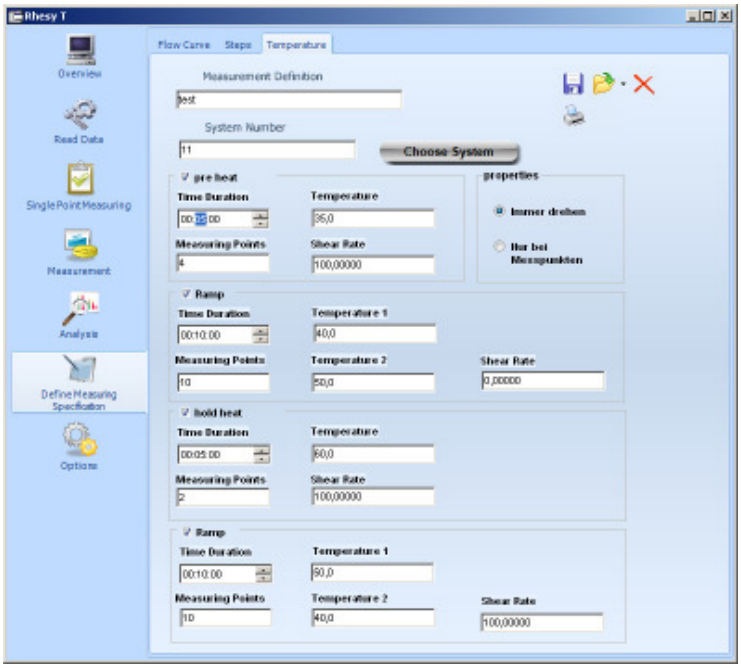


4.2. Temperature sweep (Rhesy T)

Type in the required name for the measuring definition. Please assure that no special characters (spaces are allowed) are within the chosen name

Measuring system: Choose the type of measuring system by clicking on the “Choose System” button and select the system in use.

Type of Rheomat: Choose which Rheomat is being used with the software from the pull down menu. (Rheomat R 180, RM180, R 180T or R 225)



The following phases can be defined:
Pre Heat, upward ramp, holding time and downward ramp

Properties:

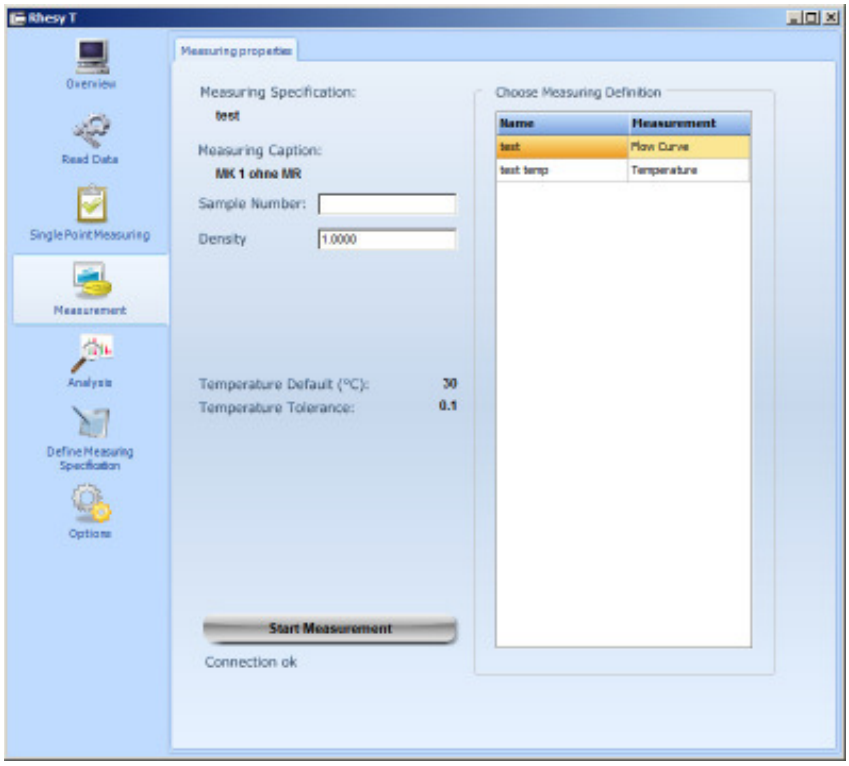
Please choose if the measuring system should run all the time or only when a measuring point is reached.

Time duration: As soon as the Julabo has reached the required temperature, a measuring will take place after the pre-defined time has lapsed.

Icons (Top right of window): Save, Open an existing measuring specification, Delete and Print.

5. Starting a measurement

The following window appears when starting a measurement:



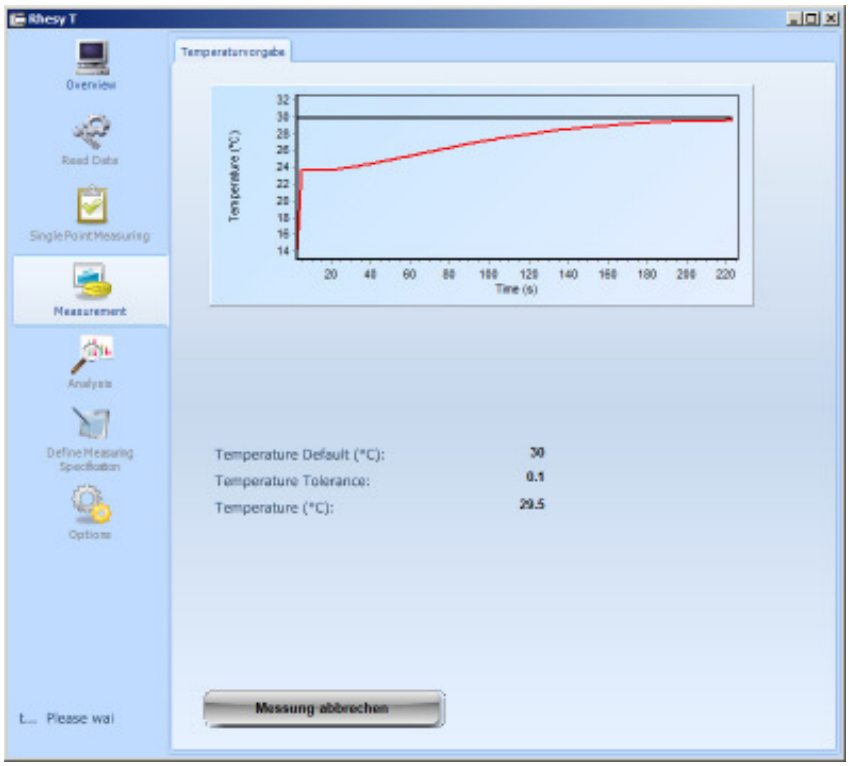
Specimen number: Enter a freely customizable number.
Choose a measuring specification. The measuring system is defined in the measuring specifications (point 4) and is automatically chosen.

Before measuring, the Rheomat has to be connected to the software by clicking on “Connect to Rheomat”. Switch on the Rheomat and when the temperature is shown in the display, press the “computer” button on the Rheomat R 180.

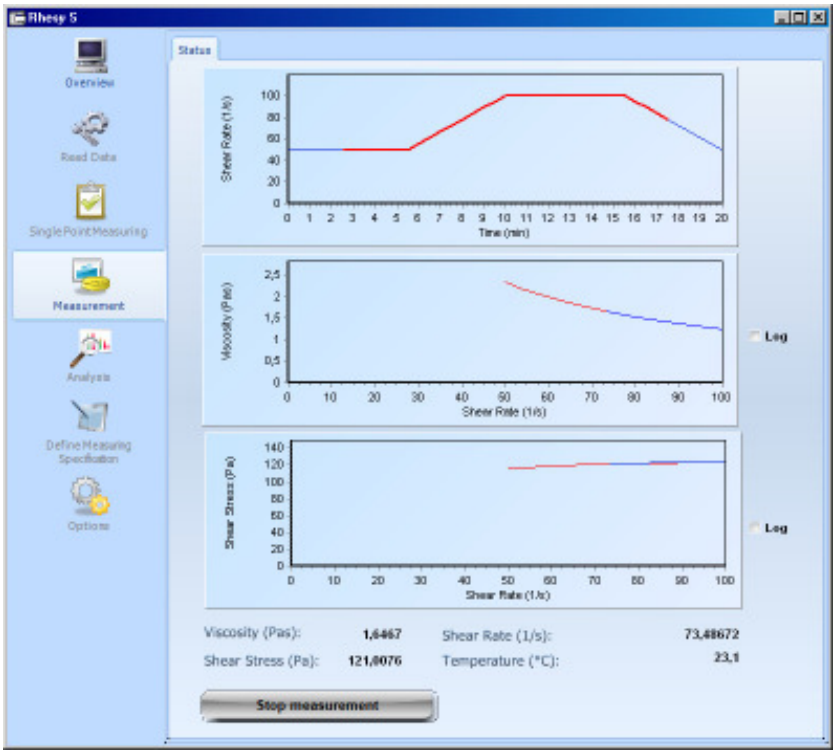
The word “Computer operation” will show on the display of the Rheomat R 180 and a window “Viscosity- and temperature values tabular” will appear.

5.1. Flow curve

To start a measuring click on “Start measurement“
If a target temperature has been defined, measuring waits until the actual temperature is within the pre-defined tolerance. After reaching the temperature, the set Julabo holding time is waited for, before the specimen is completely tempered.



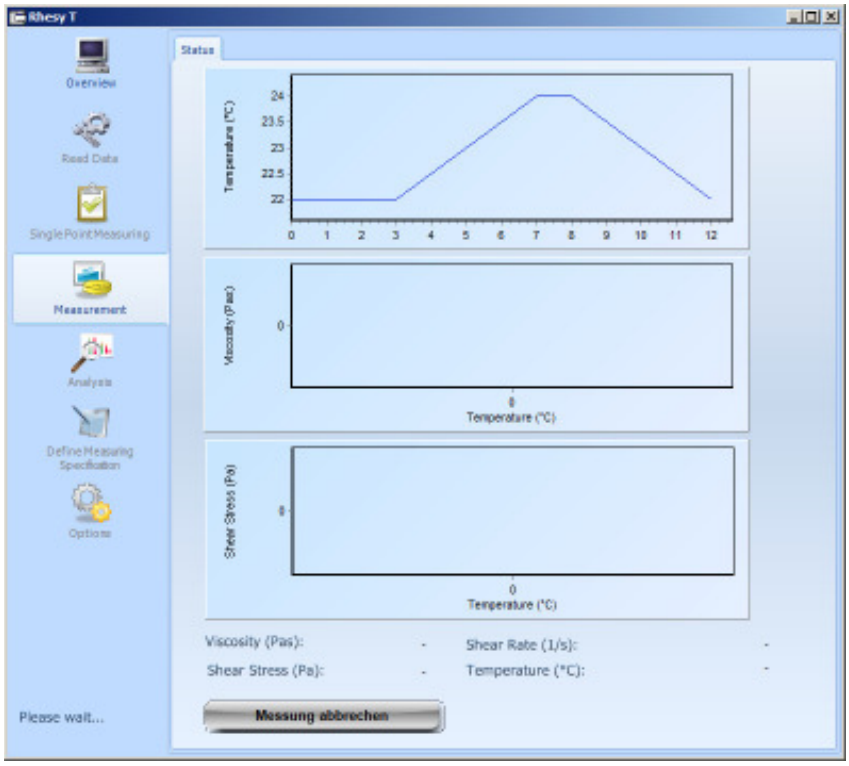
Before changing to measure the flow curve, the Julabo stops briefly and then starts again.



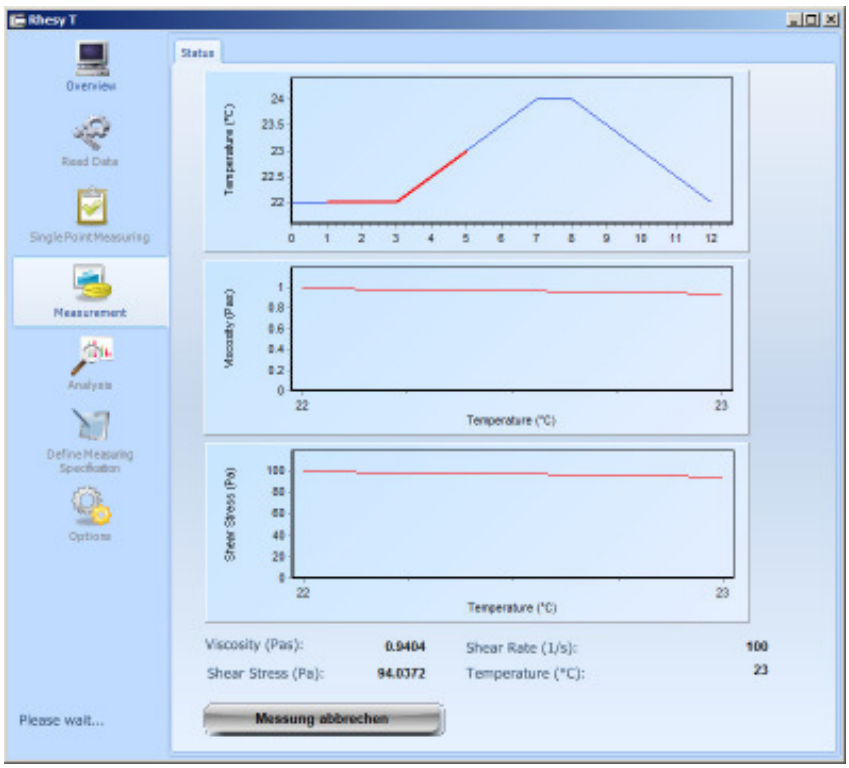
After measuring is complete, the results can be saved for later use.

5.2. Temperature sweep

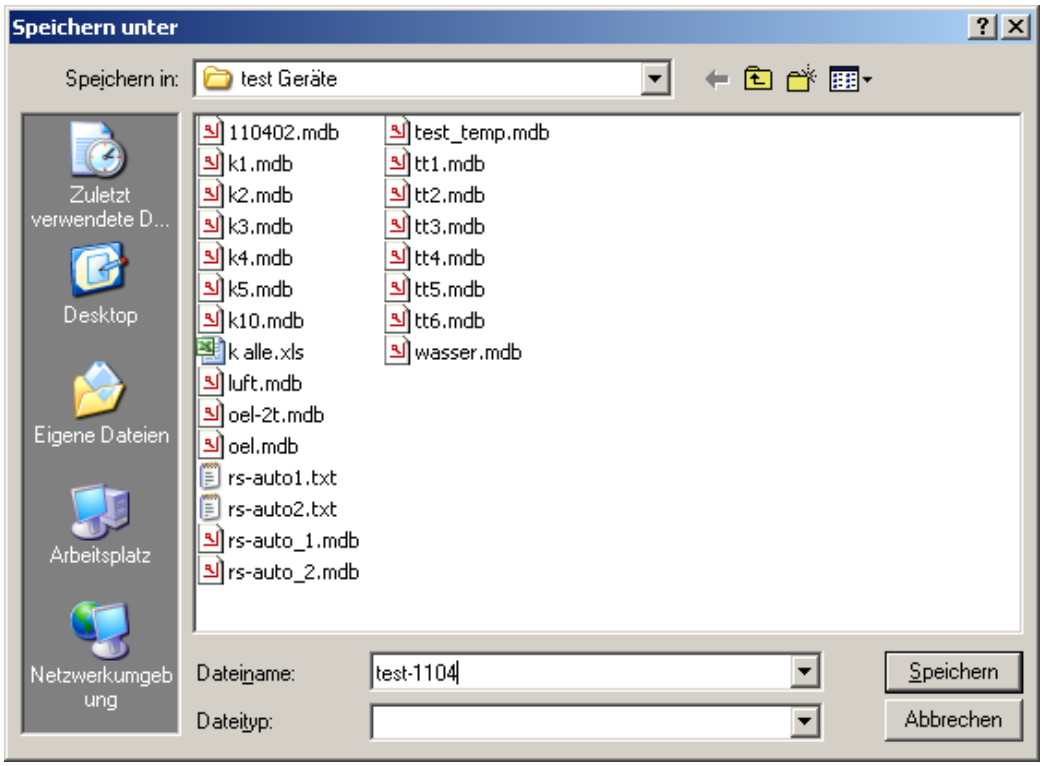
Before measuring a temperature sweep, the cryostat has to be brought up to temperature. During this time the desired temperature is shown on the cryostat and the programmed temperature curve is shown on screen.



When the set temperature is reached. measuring starts automatically.



After measuring is complete, the results can be saved for later use.

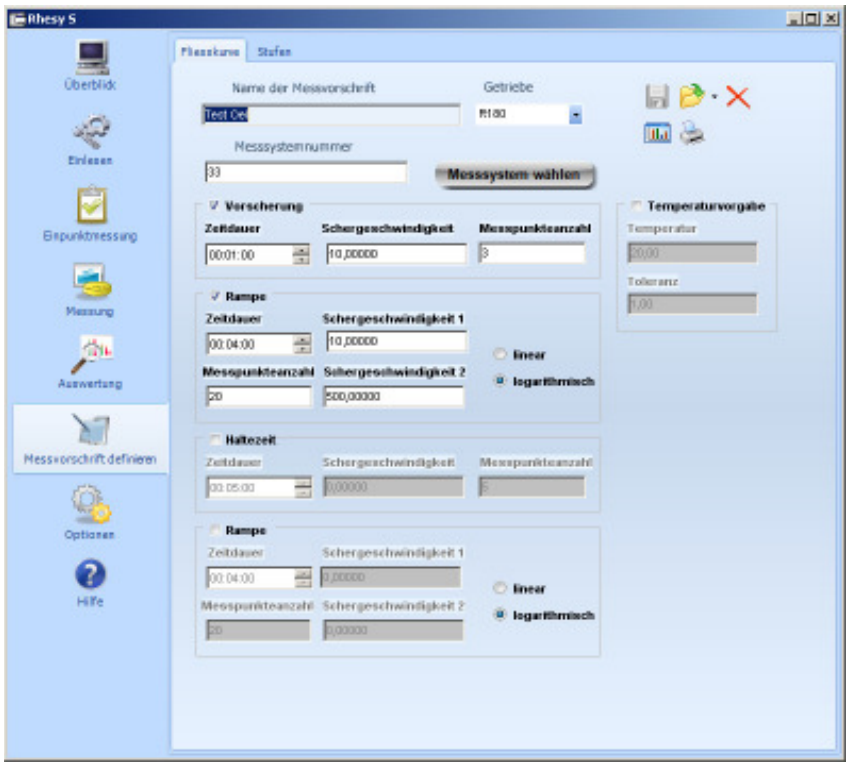


The measured data is now ready to be analysed.

6. Application example

6.1. Silicone oil

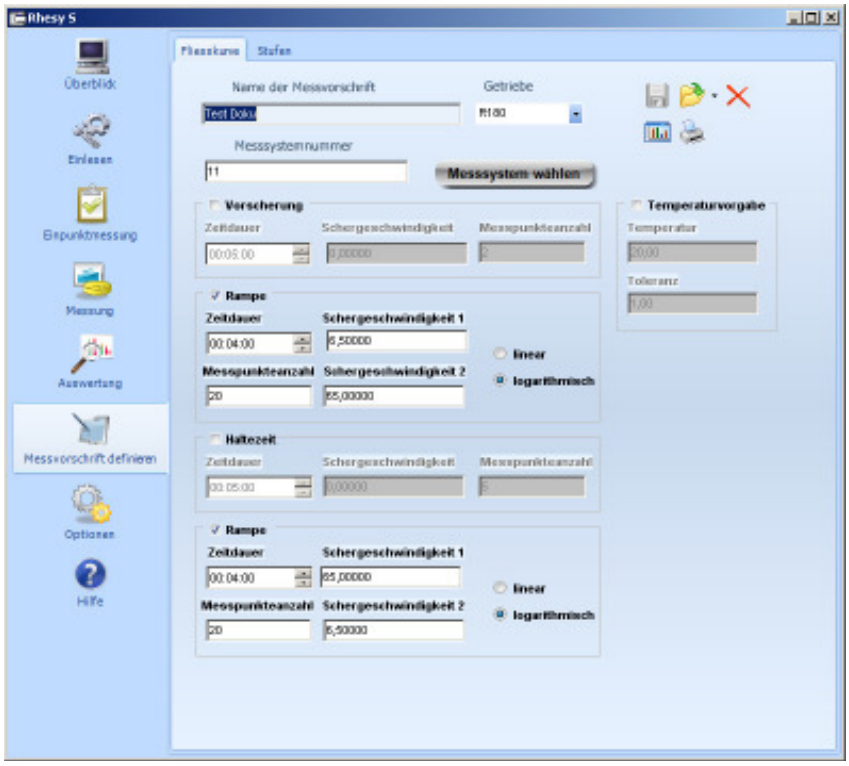
Measuring specification: flow curve, upward ramp only with pre shearing.



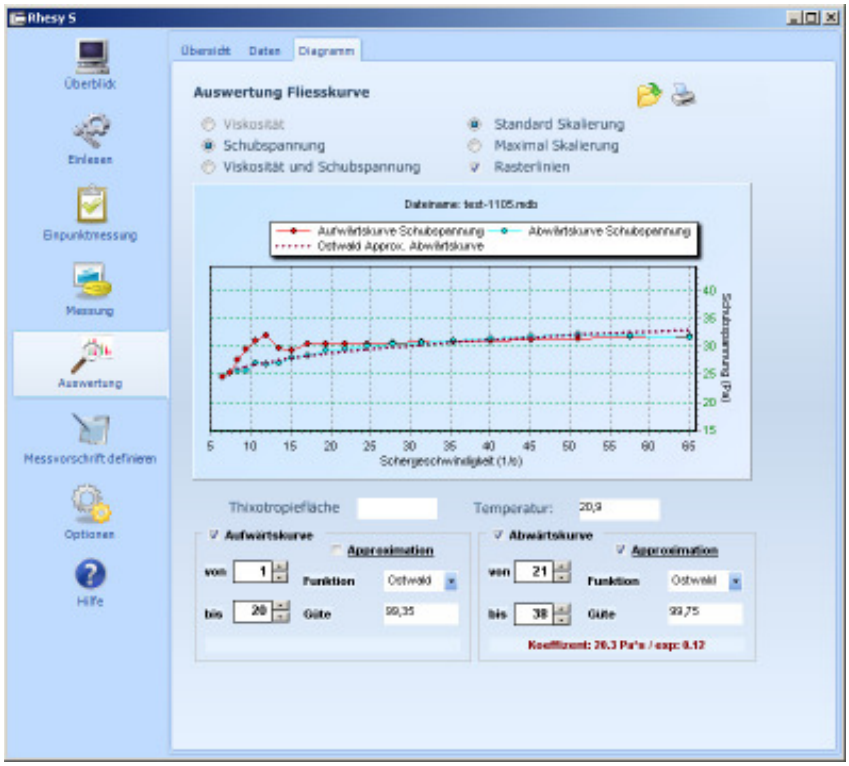
Results:

6.2. Liquid soap

Measuring specifications:



Result:



The viscoelastic nose is clearly visible at the start of the upward ramp.

7. Tips and tricks

Error whilst starting the software:

- Update the MDAC components.

No connection between the Rheomat R 180 and the Software

- Check connection rate: soft- and hardware settings the same?
- Cable: original cable in use?
- COM Port- settings correct?
- Check if software has accidentally been started more than once.

No Licence

- Re- install software

Program will not start

- Check operating system.
- Update your operating system.

For further questions:

proRheo GmbH
D- 75382 Althengstett
Tel +49 – (0) 7051 – 924890
Fax +49 – (0) 7051 – 9248929
office@prorheo.de

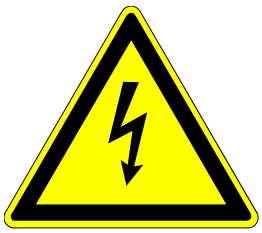
8. Sicherheitshinweise

Die Einhaltung dieser Sicherheitshinweise entbindet den Verwender grundsätzlich nicht von seiner Pflicht, eigenverantwortlich für Sicherheit, Gesundheit und Umweltschutz zu sorgen, um mögliche Gefährdungen oder Belastungen für sich oder Dritte auszuschließen oder auf ein akzeptables Restrisiko zu beschränken.

Der Betrieb des Gerätes in feuchten und nassen Bereichen sowie in Bereichen mit aggressiver chemischer Atmosphäre ist verboten.

Der Betrieb im Freien ist verboten.

Das Gerät und insbesondere die elektrische Ausrüstung vor eindringender Feuchtigkeit schützen!



Vorsicht: Gefährliche Spannung!

In dem Gerät können gefährliche Spannungen (230 V Wechselspannung) verwendet werden.

Die Netzzuleitung steht unter gefährlicher Spannung.

Das Gerät darf nur an Netz-spannungen mit 230 V Wechselspannung und einer Netzfrequenz von 50 Hz angeschlossen werden.

Flüssigkeiten und Aerosole dürfen nicht in die elektrischen Betriebsmittel eindringen.

Bei **Gefahrensituationen** schalten Sie sofort den Netzschalter aus.
Durch ausschalten des Netzschalters wird das Gerät spannungsfrei geschaltet

Die Netzzuleitungen und die Signalkabel können durch eine nicht sachgerechte Leitungsverlegung eine gefährliche **Stolpergefährdung** darstellen.
Verlegen Sie die Kabel geschützt und außerhalb des Verkehrsbereiches

Instandhaltungsmaßnahmen an der elektrischen Ausrüstung und den mechanischen Komponenten des Geräts wie Wartungen, Inspektionen und Instandsetzungen dürfen nur von **befähigten Personen** durchgeführt werden.

Die Geräteoberflächen dürfen niemals mit **ungeeigneten Flüssigkeiten** und Lösemitteln (brennbare, explosionsfähige oder anlösende Chemikalien wie Alkohole oder Nitro-verdünnungen) gereinigt werden.
Verschmutzungen an den Oberflächen dürfen nur mit einem trockenen oder nebelfeuchten Lappen entfernt werden, der mit einem geeigneten Industrie- oder haushaltsüblichen Allzweckreiniger benetzt wurde.

Betreiben Sie das Gerät nur an vor mechanischen Gefährdungen **geschützten Aufstellungsorten**.

Achten Sie beim Transport des Gerätes auf eine geeignete Ladungssicherung und Verpackung.

Nach erheblichen mechanischen Beschädigungen muss für das Gerät eine fachgerechte Instandhaltung eingeleitet werden.

Verhindern Sie den Umgang und den Betrieb des Geräts durch unbefugte Personen.

Das Gerät muss regelmäßig, mindestens jedoch nach vier Jahren, auf die Einhaltung der berufsgenossenschaftlichen Vorschrift BGV A 3 überprüft werden.

Insbesondere müssen Durchgängigkeitsprüfungen des Schutzleitersystems durchgeführt werden.

Das Gerät darf <u>nicht</u> in explosions-gefährdeten Bereichen oder in aggressiven chemischen Atmosphären betrieben werden.

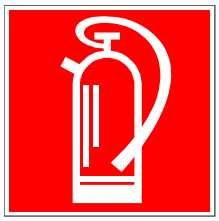
Der Verwender darf die elektrischen Betriebsmittel nicht öffnen oder Schutzverkleidungen oder Schutzabdeckungen entfernen.

Das Gerät darf nur innerhalb von **trockenen Räumen** bei **normaler Raumtemperatur** und **Luftfeuchtigkeit** betrieben werden.
Sehr kalte Geräte müssen vor dem Anschluss an die Netzspannung mindestens 6 Stunden in normaler Raumtemperatur gelagert werden.
Bei Nichtbeachtung dieses Hinweises kann die elektrische Ausrüstung durch Kondenswasserbildung innerhalb des Gerätes Schaden nehmen oder eine erhebliche Gefährdung durch den elektrischen Strom für den Betreiber auftreten.

Die Netzzuleitungen und die Signalleitungen dürfen mechanisch nicht durch Zug, Druck oder Abscheren belastet werden.

Die Manipulation von Sicherheitseinrichtungen wie z. B. der Feinsicherungen ist grundsätzlich verboten.
Beim Ausfall von Sicherheitseinrichtungen darf das Gerät bis zu einer bestimmungsgemäßenen Instandhaltung nicht weiter betrieben werden.

Das Gerät darf nicht betrieben werden, wenn erhebliche Sicherheitsmängel aufgetreten sind.
Nach dem Auftreten von erheblichen Mängeln muss das Gerät energiefrei geschaltet werden und ein Wiedereinschalten bis zur fachgerechten Instandhaltung wirksam verhindert werden.



Das Gerät muss im Brandfall mit geeigneten **Löschmitteln** gelöscht werden.
Geeignete Löschmittel sind: ABC-Pulver, CO_2 oder AB-Schaum

Beachten Sie beim Löschereinsatz einen Sicherheitsabstand zu den elektrischen Betriebsmitteln von mindestens 1 m.
Beachten Sie die einschlägigen Brandschutzbestimmungen sowie die Brandschutzordnungen Ihres Betriebes.

9. Support / Service

Please fill in the form and send in via fax to the following number:

+49 - 7051 – 92489-29

Company
_____

Name
_____

Section
_____

Telephone
_____

Fax
_____

email
_____

Address
_____

Address
_____

Please contact us regarding the following unit:

Serial number _____

☐ Service / Calibration

☐ Technical questions